POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, U.S. Navy, Superintendent U.S. Naval Observatory. Data furnished by the U.S. Naval Observatory in cooperation with Harvard and Mount Wilson Observatories. Difference in longitude is measured from the central meridian, positive west. North latitude is positive. Areas are corrected for foreshortening and are expressed in millionths of the sun's visible hemisphere. The total area for each day includes spots and groups]

Date	Eastern standard time	Heliographic			Area		Total area for each day	Observatory
		Diff. in longitude	Longitude	Latitude	Spot	Group		
1933	h. m.	°	°	°				
Jan. 1	14 52	No spots						U.S. Naval.
Jan. 2	13 58	No spots						Do.
Jan. 3	11 12	No spots						Mount Wilson.
Jan. 4	11 18	No spots						Do.
Jan. 5	11 26	No spots						Do.
Jan. 6	11 18	No spots						Do.
Jan. 7	10 51	No spots						Do.
Jan. 8	11 43	No spots						U.S. Naval.
Jan. 9	12 0	No spots						Do.
Jan. 10	11 50	No spots						Do.
Jan. 11	— —	No spots						Do.
Jan. 12	12 45	+4.0	147.4	+5.0		16	16	Mount Wilson.
Jan. 13	12 30	+18.0	148.4	+5.0		29	29	Do.
Jan. 14	12 50	+32.0	149.1	+4.0		42	42	Do.
Jan. 15	11 27	+45.0	149.7	+4.5		46	46	U.S. Naval.
Jan. 16	13 19	+59.0	149.5	+4.5		69	69	Do.
Jan. 17	11 52	+73.0	151.1	+4.5		69	69	Do.
Jan. 18	11 36	No spots						Do.
Jan. 19	11 35	No spots						Do.
Jan. 20	11 44	No spots						Do.
Jan. 21	12 56	No spots						Do.
Jan. 22	10 50	No spots						Mount Wilson.
Jan. 23	13 52	No spots						U.S. Naval.
Jan. 24	11 5	No spots						Do.
Jan. 25	11 30	No spots						Do.
Jan. 26	13 56	No spots						Do.
Jan. 27	11 46	No spots						Do.
Jan. 28	13 1	No spots						Do.
Jan. 29	11 20	No spots						Do.
Jan. 30	11 26	−47.0	220.2	+30.0		39	39	Do.
Jan. 31	11 21	−34.0	220.1	+30.0		39	39	Do.
Mean daily area for January							11	

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR JANUARY 1934

(Dependent alone on observations at Zurich and its station at Arosa)

[Data furnished through the courtesy of Prof. W. Brunner, Eidgen. Sternwarte, Zurich, Switzerland]

January 1934	Relative numbers	January 1934	Relative numbers	January 1934	Relative numbers
1	0	11	0	21	0
2	0	12	*Mc* 8	22	
3		13	11	23	
4	0	14	12	24	0
5	0	15	13	25	0
6	0	16		26	0
7	0	17	11	27	0
8	0	18		28	0
9	0	19	0	29	*Ec* 8
10	0	20		50	11
				31	

Mean: 24 days=3.1.

c=New formation of a center of activity; *E*, on the eastern part of the sun's disk; *W*, on the western part; *M*, in the central zone.

AEROLOGICAL OBSERVATIONS

[Aerological Division, L. T. Samuels, temporarily in charge]

By L. T. SAMUELS

Free-air temperatures for January, as shown in table 1, averaged above normal at all stations except Boston and Pensacola. Departures of considerable magnitude occurred at Omaha, and Pembina. Relative humidity departures for the month were of opposite sign to those for temperature except at Cleveland, Dallas, and Omaha, where the departures were positive for both of these elements.

In most cases the resultant free-air wind directions for the month did not differ appreciably from the normals (table 2). Moderate excesses in the resultant velocities were general at the northern stations but elsewhere no consistent variations from the normals occurred.

During January, the International month for 1934, 46 sounding balloons were released from the Omaha Airport Station. To date 33 of the meteorographs carried by these balloons have been returned.

TABLE 1.—*Free-air temperatures and relative humidities obtained by airplanes during January 1934*

TEMPERATURE (° C.)

Altitude (meters) m.s.l.	Boston, Mass.[1] (6 meters)		Cleveland, Ohio [2] (246 meters)		Dallas, Tex.[3] (146 meters)		Omaha, Nebr.[4] (300 meters)		Pembina, N.Dak.[5] (243 meters)		Pensacola, Fla.[6] (2 meters)		San Diego, Calif.[6] (9 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	−4.3	(7)	−1.3	(7)	5.9	(7)	−3.9	(7)	−15.9	(7)	10.2	−1.1	11.6	−0.8
500	−6.1	(7)	−1.2	(7)	7.9	(7)	−2.1	(7)	−13.2	(7)	9.6	−1.3	14.1	+2.0
1,000	−6.7	−4.1	−2.8	+3.4	8.3	+2.6	.4	+5.0	−8.8	+2.5	8.5	−1.1	13.5	+2.9
1,500	−7.8	−4.6	−3.5	+3.1	7.1	+2.1	.5	+4.6	−7.7	+3.1				
2,000	−9.7	−5.3	−4.9	+2.7	5.2	+1.8	−.5	+4.9	−8.3	+4.3	5.3	−1.4	8.8	+2.7
2,500	−11.8	−5.6	−7.0	+2.4	2.6	+1.3	−2.9	+4.7	−10.3	+4.3				
3,000	−14.0	−5.3	−8.9	+2.8	−.2	+0.9	−5.6	+4.5	−12.6	+4.5	−.4	−2.7	3.2	+1.9
4,000	−18.5	−3.5	−14.2	+2.3	−6.2	+0.4	−11.7	+3.7	−18.0	+4.9	−6.0	−2.8	−4.5	+1.4
5,000	−24.3	−4.1	−20.8	+2.6	−13.4	−0.7	−18.2	+3.3	−24.0	+4.0	−11.2	−2.8		

RELATIVE HUMIDITY (PERCENT)

Surface	76	(7)	77	(7)	87	(7)	84	(7)	84	(7)	82	0	69	+3
500	77	(7)	75	(7)	78	(7)	82	(7)	77	(7)	78	+2	49	−10
1,000	77	+10	74	+9	71	+10	72	+6	68	+2	73	+4	36	−15
1,500	76	+14	69	+11	62	+8	67	+8	63	+3				
2,000	76	+17	67	+14	55	+6	62	+5	59	0	64	+7	28	−12
2,500	73	+18	67	+14	49	+3	62	+6	55	−3				
3,000	71	+19	64	+10	45	+3	61	+5	53	−4	58	+9	25	−6
4,000	70	+18	58	+3	35	−3	58	+5	52	−2	51	+9	24	−5
5,000	71	+23	57	−2	32	−4	56	+2	50	−7	53	+9		

[1] Airplane observations made by Massachusetts Institute of Technology; departures based on normals obtained from 264 kite observations made at Blue Hill Meteorological Observatory (1896–1903).

[2] Temperature departures based on normals determined by extrapolating latitudinally those of Royal Center, Ind., and Due West, S.C. Humidity departures based on normals of Royal Center, Ind.

[3] Temperature departures based on normals determined by interpolating latitudinally those of Groesbeck, Tex., and Broken Arrow, Okla. Humidity departures based on normals of Groesbeck, Tex.

[4] Temperature and humidity departures based on normals of Drexel, Nebr.

[5] Temperature departures based on normals determined by extrapolating latitudinally those of Ellendale, N.Dak., and Drexel, Nebr. Humidity departures based on normals of Ellendale, N.Dak.

[6] Naval air stations.

[7] Surface and 500-meter level departures omitted because of difference in time of day between airplane observations and those of kites upon which the normals are based.

Times of observations: Weather Bureau, 5 a.m.; Navy, 7 a.m.; and Massachusetts Institute of Technology, 8 a.m. (E.S.T.).

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot-balloon observations made near 7 a.m. (E.S.T.) during January 1934*

[Wind from N=360°, E=90°, etc.]

Altitude (meters) m.s.l.	Albuquerque, N. Mex. (1,554 meters)		Atlanta, Ga. (309 meters)		Bismarck, N.Dak (518 meters)		Brownsville, Tex. (7 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (192 meters)		Cleveland, Ohio (245 meters)		Dallas, Tex. (154 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (14 meters)		Key West, Fla. (11 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	341	1.2	319	2.1	308	1.9	346	0.4	215	1.9	296	6.0	258	2.4	234	3.8	310	0.6	240	4.0	330	1.9	60	2.6
500			332	4.8			134	3.7	222	4.3			252	6.9	242	6.8	225	2.3			353	1.5	85	5.7
1,000			319	5.7	297	8.1	184	3.3	254	5.8			271	11.2	263	12.1	256	5.5	251	9.6	250	3.1	104	4.1
1,500			301	7.3	297	10.7	190	3.9	273	9.3			279	12.7	272	13.0	274	6.0	276	14.3	260	5.2	114	1.2
2,000	351	3.4	292	11.1	294	11.3	221	4.1	293	13.9	296	8.7	281	10.2	284	17.3	294	7.6	281	12.9	261	7.1	259	1.2
2,500	312	4.3	283	11.0	300	13.9	219	7.3	294	17.0	311	11.1	288	10.4	284	16.5	286	8.6	285	14.0	261	8.1	270	2.6
3,000	298	5.5	272	11.0	292	11.2	224	7.0	276	17.0	314	11.2	290	13.6	285	16.9	291	9.9	295	14.7	261	9.4	282	4.4
4,000	302	7.7	272	12.0			244	7.8			299	9.6					277	10.2	290	10.8			276	6.2
5,000	293	8.4									329	5.7												

Altitude (meters) m.s.l.	Los Angeles, Calif. (217 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (83 meters)		New Orleans, La. (1 meter)		Oakland, Calif. (8 meters)		Oklahoma City, Okla. (402 meters)		Omaha, Nebr. (306 meters)		Phoenix, Ariz. (338 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D.C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	350	1.0	187	0.3	145	0.5	33	1.2	83	1.6	274	1.2	306	1.1	101	1.8	162	1.8	358	0.6	175	2.2	292	1.0
500	28	1.3	213	0.2	236	4.7	63	1.8	34	4.4	254	1.9	276	3.2	85	2.8			329	7.1	197	7.6	272	5.2
1,000	26	2.3	161	1.0	263	5.2	29	1.6	22	6.9	271	4.5	283	7.4	65	2.2			312	4.9	202	6.4	276	8.3
1,500	20	3.8	246	3.0	274	8.6	268	5.4	5	6.2	283	6.1	289	9.5	65	1.8	176	2.5	298	6.7	203	3.9	290	10.1
2,000	11	5.3	269	3.5	277	10.2	276	7.3	350	7.1	292	7.5	280	10.3	43	1.1	214	1.1	286	9.9			287	10.8
2,500	11	5.6	314	5.7	289	10.2	262	9.6	350	7.0	293	8.0	277	12.8	345	1.4	296	2.9					295	10.2
3,000	357	6.2	315	8.3	290	10.5	258	11.3	346	6.8	292	9.5	281	13.6	317	3.3	298	5.7					286	9.6
4,000	359	7.1	314	11.7					330	7.0	287	12.1			321	5.6	323	10.0						
5,000	335	6.9													314	5.2	324	10.5						